

## T08D07 – Topic 01 Review: Acid Nomenclature

Name

KEY

The naming of acids is different from naming ionic or molecular compounds. Acids are molecular compounds that are dissolved in water. Essentially there are two different types of acids. One type is called binary acids and they consist of two elements: Hydrogen and any non-metal with the exception of oxygen, and oxyacids which consists of three or more elements: hydrogen and a polyatomic ion containing oxygen. Each has its own process for naming.

**BINARY acids** ( Two elements-Hydrogen and any non-metal except oxygen)

Again when making a compound the positive ion (cation) and negative ion (anion) must equal zero. Remember these are molecular compounds. Hydrogen which is a +1 (and written first) will combine with non-metals of families 14, 15, 16 and 17 to form acids.

If hydrogen combines with sulfur then we have the compound  $H_2S$ , and when put into water solution we would call this hydrosulfuric acid. If H reacts with nitrogen we form  $H_3N$ , and if put into water solution we would have hydronitric acid.. Compounds have to have a neutral charge (pluses must equal minuses).

All binary acids always begin with the word *hydro*, and end with *ic*. The non-metal may or may not change its form. Sulfur stays sulfur ( $H_2S$  is hydrosulfuric acid) but nitrogen changes to nitr ( $H_3N$  is hydronitric acid). These take practice as does all of chemistry.

Try the following.

Write the formula for the following binary acids.

hydrochloric acid

HCl

hydrophosphoric acid

 $H_3P$ 

hydroselenic acid

 $H_2Se$ 

hydroiodic acid

HI

hydrofluoric acid

HF

hydrocarbonic acid

 $H_2C$ 

hydroarsenic acid

 $H_3A$ 

hydrobromic acid

 $HBr$ 

Write the name of the following binary acids.

 $H_2Se$ hydroselenic acid

HCl

hydrochloric acid

HF

hydrofluoric acid

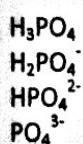
HI

hydroiodic acid $H_3As$ hydroarsenic acid $H_3N$ hydronitric acid

## Addition or Removal of H atoms from an Oxoanion

Remember an acid is a substance that has the ability to yield  $H^+$  ions, therefore an oxoacid can lose or gain H atoms. These are the following rules for naming the oxoanions (charged oxoacid compounds). The chart above can also be used for the naming of oxoanions.

1. When all the H ions are removed from the "-ic" acid, the anions name is "-ate"
2. When all the H ions are removed from the "-ous" acid, the anions name is "-ite"
3. Name of anions in which one or more *but not all* of the H ions are removed, we must indicate the number of H ions still present by using the greek prefixes (omitting mono-)



phosphoric acid (the "-ic" form)  
 dihydrogen phosphate (lost 1 H ion, but not all)  
 hydrogen phosphate (lost 2 H ions, but not all)  
 phosphate (lost all the H ions from the "-ic" form)

Try these....

Write the correct formula for these oxyacids.

chloric acid  $HClO_3$

iodic acid  $HIO_3$

nitric acid  $HNO_3$

perbromic acid  $HBrO_4$

phosphoric acid  $H_3PO_4$

chlorous acid  $HClO_2$

phosphorous acid  $H_3PO_3$

carbonic acid  $H_2CO_3$

nitrous acid  $HNO_2$

hypochlorous acid  $HClO$

oxalic acid  $H_2C_2O_4$

tartaric acid  $H_2C_4H_4O_6$

Write the name for these oxyacids.

$HClO_2$  chlorous acid

$H_3PO_3$  phosphorous acid

$HC_2H_3O_2$  acetic acid

$HMnO_4$  permanganic acid

$HClO_3$  chloric acid

$HBrO_3$  bromic acid

$HClO_4$  perchloric acid

$HCN$  cyanic acid

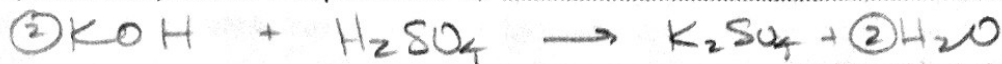
$HClO$  hypochlorous acid

$H_2CrO_4$  chromic acid

Again just because I can write the formula for or name an oxyacid does not mean that it exists. This is all there is to naming acids. You have to keep them straight and remember practice, practice, and more practice makes you good at doing this. We will use nomenclature all year long. You must remember it for the entire year.

## Practice Balancing and Predicting:

- 1) potassium hydroxide + sulphuric acid
- $\rightarrow$
- .....



- 2) nitric acid + sodium oxide
- $\rightarrow$
- .....



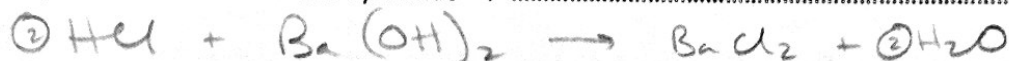
- 3) iron carbonate + nitric acid
- $\rightarrow$
- .....



- 4) hydrochloric acid + zinc
- $\rightarrow$
- .....



- 5) hydrochloric acid + barium hydroxide
- $\rightarrow$
- .....



- 6) sulphuric acid + potassium hydrogencarbonate
- $\rightarrow$
- .....



- 7) iron + hydrochloric acid
- $\rightarrow$
- .....



- 8) nitric acid + lead oxide
- $\rightarrow$
- .....



- 9) .....
- $\rightarrow$
- copper sulphate + water + carbon dioxide



- 10) .....
- $\rightarrow$
- hydrogen + zinc nitrate



What solution will the following salts form; neutral, acidic, or basic:

- 1.
- $\text{NH}_4\text{Cl}$
- acidic
- $\text{NH}_4\text{OH} = \text{weak base}$
- 
- $\text{HCl} = \text{strong acid}$

- 2.
- $\text{RbCl}$
- neutral
- $\text{Rb}(\text{OH})_2 = \text{SB}$
- 
- $\text{HCl} = \text{SA}$

- 3.
- $\text{BaF}_2$
- basic
- $\text{Ba}(\text{OH})_2 = \text{SB}$
- 
- $\text{HF} = \text{WA}$

- 4.
- $\text{KCl}$
- neutral
- $\text{KOH} = \text{SB}$
- 
- $\text{HCl} = \text{SA}$

- 5.
- $\text{MgBr}_2$
- acidic
- $\text{Mg}(\text{OH})_2 = \text{WB}$
- 
- $\text{HBr} = \text{SA}$